

# THE MINERAL INDUSTRIES OF THE MIDDLE EAST

By Philip M. Mobbs, Glenn J. Wallace, David R. Wilburn, and Thomas R. Yager

The 15 nations of the Middle East that are covered in this volume encompass an area of more than 6 million square kilometers, which is about two-thirds the size of the United States. In 2003, the total population of the Middle East region was estimated to be about 252 million compared with 291 million for the United States and 6.3 billion for the world.

## Acknowledgments

The U.S. Geological Survey (USGS) acknowledges and expresses its sincere appreciation to the following Government agencies for providing minerals production statistics in 2003: the Oil and Gas Directorate of the Ministry of Oil in the Kingdom of Bahrain; the Mines Service of the Ministry of Agriculture, Natural Resource, and Environment in the Republic of Cyprus; the Ministry of Commerce and Industry in the Sultanate of Oman; and the General Directorate of Petroleum Affairs and the State Institute of Statistics in Turkey.

## General Economic Conditions

In 2003, the real gross domestic product (GDP) of the Middle East region grew by an estimated 2.7% compared with 2.5% in 2002. The economies of most of the countries in the region were based on the production and processing of crude oil and natural gas; the leading oil producers reported significantly better than average growth of GDP in 2003 (table 2). Exports of nations on the Persian Gulf were dominated by hydrocarbons. The average free-on-board (f.o.b.) cost of crude oil imports entering the United States from Persian Gulf nations was \$25.17 per barrel in 2003, an average price not seen since 1984. In 2002, the average f.o.b. cost of imports from the Gulf region was \$23.38 compared with \$18.89 in 2001 (U.S. Energy Information Administration, 2005b). Energy-intensive mineral-processing operations, such as aluminum smelting, were attracted to some of the countries in the region by the availability of low-cost electrical energy, which was generated with locally produced natural gas and petroleum.

The region's burgeoning population and increasing unemployment has focused Government attention on the need for job creation. The region's economies, which have been dominated by Government-owned companies and organizations and by the production of crude oil, have begun to diversify. There is increased emphasis on private sector participation in economic activity and the development of the financial, nonfuel mineral, and trade sectors.

## Investment Data and Political Risk

The military action against Iraq in early 2003 tempered short-term investor interest in the region, but the proposed reconstruction of Iraqi infrastructure and the sustained international demand for minerals, especially mineral fuels, resulted in the rebound of domestic, foreign, and Government investment interest in the mineral operations in the area by midyear.

State-owned companies dominated the region's mineral industry, although foreign investment was finding its way into the mineral sector. Proposed mineral-industry-related investment in the region focused on construction or expansion of mineral-processing facilities, which included aluminum smelters, ammonia and urea plants, cement plants, chlorine plants, crude oil refineries, liquefied natural gas (LNG) plants, methanol plants, natural-gas-processing plants, and natural-gas-to-liquids facilities.

Expansion of copper mining and refining capacity continued in Iran, and additional iron-and-steel-processing facilities were proposed for several countries. Progress was made on the development of nickel resources in Turkey, phosphate resources in Saudi Arabia, and zinc resources in Iran and Yemen.

## Legislation

A new mining law was promulgated in Oman. Changes in laws and regulations concerning foreign participation in the mineral industry were under discussion in Kuwait and Saudi Arabia.

## Exploration

Government agencies engaged in mineral prospecting and general exploration included the Department of Geological Survey of the Directorate General of Minerals in Oman, the General Directorate of Mineral Research and Exploration in Turkey, the Geological Survey and Mineral Resources Board of Yemen, the Geological Survey of Iran, and the Saudi Geological Survey. Local and international exploration companies were allowed to explore for minerals in most countries of the region. Crude oil and natural gas exploration was undertaken by Government and international oil companies.

Exploration activity in the Middle East was adversely affected by the unrest in the area. In 2003, hydrocarbon exploration continued in Bahrain, Iran, Israel, Jordan, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, the United Arab Emirates, and Yemen.

Industrial mineral and metal exploration activity was concentrated in Iran and Turkey, although some exploration and prospecting for base and precious metals also took place in Cyprus, Jordan, Oman, Saudi Arabia, and Yemen.

## Commodity Overview

The Middle East has significant reserves of boron minerals, crude oil, natural gas, and phosphate rock. The outlook segments of the mineral commodity tables are based on projected trends that could affect current (2003) producing facilities and on planned new facilities that operating companies, consortia, or Governments have projected to come online within indicated timeframes. Forward-looking information (which includes estimates of future production, exploration and mine development, cost of capital projects, and timing of the start of operations) are subject to a variety of risks and uncertainties that could cause actual events or results to differ significantly from expected outcomes. Projects listed in the following section are presented as an indication of industry plans and are not a USGS prediction of what will happen. The USGS provides no warranty, expressed or implied, as to the accuracy, reliability, or completeness of furnished data and is under no obligation to correct or update any forward-looking statements, whether as a result of new information or as future events take place.

## Metals

**Aluminum.**—Regional aluminum output was expected to increase by the end of the decade. Aluminium Bahrain B.S.C.'s expansion of potline 4 and completion of potline 5 were expected to bring the company's total capacity to 850,000 metric tons per year (t/yr) by 2006; development of the proposed potline 6 would increase total capacity to 1 million metric tons per year (Mt/yr) by 2009. Construction of Dubai Aluminium Co. Ltd.'s (Dubal) 212-pot potline 9 was nearly complete in the United Arab Emirates. Potline 9 would raise the company's nominal capacity to 710,000 t/yr. Dubal proposed to begin construction of the 120-pot potline 7 in 2004, which would raise the company's design capacity to 761,000 t/yr. Actual production capacity was expected to be about 781,000 t/yr (Middle East Economic Digest, 2004a; Reuters 2003<sup>1</sup>).

**Copper.**—Mined copper ore in the Middle East was projected to increase during 2005 with the addition of production from the Meiduk and Songon Mines in Iran and as Block 1 is developed in Oman. Refined copper metal production was expected to increase owing to the National Iranian Copper Industries Co.'s ongoing expansion of the Sarcheshmeh copper refinery in Iran.

**Gold.**—New production from the Zarshouran Mine was expected to boost gold output from Iran. In Saudi Arabia, gold production was expected to decline slightly by 2005 owing to the closure of the Mahd Ahd Dhahab Mine, but recover by the end of the decade with the addition of production from the Al-Amar polymetallic mine and the rampup to full production at the Al-Hajar and Bulghah Mines.

**Iron and Steel.**—Subsidiary companies of state-owned National Iranian Steel Co. (Nisco) owned and operated the country's iron ore mines and steel facilities that included blast furnaces and electric arc furnaces. Iran's iron ore production was expected to continue to increase during the next few years to meet the projected demand from the domestic steel industry. Chadour Malu Mining and Industrial Co. was building a 3.4-Mt/yr-capacity iron ore pelletizing plant and Gol-e-Gohar Iron Ore Co. had started to build a 4 Mt/yr iron ore pelletizing plant. The Government planned to expand Nisco's crude steel production capacity to 14.5 Mt/yr by 2007.

In 2003, Qatar Steel Co. proposed a 1.2-Mt/yr expansion of its direct-reduction iron plant. In Turkey, increased international demand allowed the Turkish steel industry to again significantly increase crude steel production. The country's steel output increased by almost 10% compared with that of 2002, which followed an increase of almost 12% in 2002 compared with that of 2001. Much of the Turkish steel was produced by minimills that processed domestic and imported steel scrap in electric arc furnaces.

**Lead, Silver, and Zinc.**—In Iran, mined lead, silver, and zinc ore production was expected to increase gradually. By 2009, the Mehdiabad zinc project of Union Capital Ltd. was expected to add 160,000 t of zinc production to national output and to produce a coproduct lead and silver concentrate. Additional lead and zinc was expected to be recovered with the 800,000-t/yr-ore-production-capacity expansion planned for the Angouran Mine. Iran Zinc Mines Development Co. was expected to build a 100,000-t/yr-capacity zinc refinery at Angouran (Union Capital Ltd., 2003; 6th International Trade Fair for Machinery, Plant, Processes, Materials for Construction Industry, Building Materials and Natural Stone Industry, Coal and Ore Mining, 2004, p. 7).

In Saudi Arabia, lead and silver production was expected to drop in 2005 because of the closure of the Mahd Ahd Dhahab Mine but to gradually recover as production from the Al-Amar polymetallic mine is ramped up. In Yemen, the zinc mine that ZincOx Resources plc has proposed would generate some lead and silver coproduct.

**Nickel.**—In Turkey, two trial mining operations to evaluate lateritic nickel ores were underway. European Nickel plc mined ore from the Caldag deposit and Oriel Resources plc sampled ore at the Gordes prospect. Both companies shipped their ores to the Larco nickel smelter in Greece. European Nickel proposed to initiate and to ramp up Caldag production to 15,000 t/yr in 2007 (European Nickel plc, 2004).

## Industrial Minerals

**Phosphate Rock.**—In Jordan, the planned expansion of the Shidiya Mine was expected to result in increased production by 2007. The development of the Al Jalamid deposit in Saudi Arabia was expected to begin in 2005, with initial production in 2008. This \$1.9

<sup>1</sup>References that include a section mark (§) are found in the Internet Reference Cited section.

billion project would include an 11- to 12-Mt/yr-capacity phosphate rock mine and a beneficiation plant at Al Jalamid that would be linked by railroad to a fertilizer plant at Ras Az Zawr. The 4.5-Mt/yr-capacity beneficiation plant would be designed to produce a concentrate with an average grade of about 32% phosphorous pentoxide ( $P_2O_5$ ) (Middle East Economic Digest, 2004b).

## **Mineral Fuels**

**Natural Gas.**—Increased international interest in the development of natural gas resources has resulted in more natural gas exploration in the Middle East. Recent offshore exploration in the Mediterranean Sea and the Persian Gulf and onshore exploration in several nations has successfully delineated natural gas resources. Hydrocarbon exploration also has been proposed for the Black Sea offshore Turkey. By 2009, the continued development of offshore natural gas resources in Iran, Israel, and Qatar and onshore gas resources in Saudi Arabia, Turkey, and Yemen was expected to increase annual natural gas production in the region by more than 60%.

In 2003, production began at the Tabnak gasfield in Iran, and development of the offshore South Pars gasfield continued with the official commissioning of Phases 2 and 3 of the 15-phase South Pars development program. Most of the development of the South Pars Field, which was an extension of Qatar's North Field, was expected to be completed by 2009.

Off the Israeli coast, natural gas production from the Mari-B Field began in late 2003. Kuwait agreed to import 8 billion to 10 billion cubic meters per year of natural gas from Iran, which would supplement the 8 billion to 15 billion cubic meters per year of natural gas that Kuwait previously had agreed to pipe in from Qatar. In addition to the natural gas pipeline to Kuwait, other pipelines to move gas from Qatar's North Field were proposed to be built to Oman, Pakistan, and the United Arab Emirates. Also in Qatar, the joint venture of Oryx GTL Ltd. and Qatar Petroleum began construction of the first of several proposed natural-gas-to-liquids plants. Qatar Liquefied Natural Gas Co. Ltd. and Ras Laffan Liquefied Natural Gas Co. Ltd., which operated five LNG trains, proposed to build several additional LNG trains by 2009.

In 2003, the Government of Saudi Arabia cancelled negotiations for natural gas ventures that had been offered to international oil companies under the Saudi Gas Initiative Project; parts of the project, however, were put up for bid later in the year. In Turkey, new natural gas reservoirs were discovered in the onshore Adatepe and Cayirdere Fields. The Cayirdere Field was brought online at yearend. The long-proposed Yemen LNG plant was expected to be operational by 2009. Until the LNG plant is online, most of the natural gas produced in Yemen will continue to be reinjected.

**Petroleum.**—The start of the military action in Iraq temporarily curtailed oil production in the northern Persian Gulf region but Iraq's neighbors quickly resumed production. Resumption of crude oil production in Iraq was delayed repeatedly by the sabotage of the oil pipelines, especially the northern pipeline to Turkey. The military conflict also adversely affected regional oil shipments. Saudi Arabia responded to the regional decline in crude oil production with a 38% increase in production compared with 2002.

## **Trade Review**

The Middle East region was a major supplier of crude oil and natural gas to Asia and of crude oil to the United States. The region supplied about 25% of the 3.5 billion barrels of crude oil that the United States imported in 2003, compared with 2002 when the region accounted for about 24% of total crude oil imports of nearly 3.3 billion barrels. Saudi Arabia, which was the leading supplier of crude oil to the United States, provided about 630 million barrels (Mbbbl), or about 18% of the United States' crude oil imports. Iraq, with exports of about 175 Mbbbl to the United States, remained in sixth place on the list of the leading crude oil suppliers to the United States in 2003. Kuwait, which was the source of nearly 76 Mbbbl of crude oil, was ninth on the list (U.S. Energy Information Administration, 2005a).

## **References Cited**

- 6th International Trade Fair for Machinery, Plant, Processes, Materials for Construction Industry, Building Materials and Natural Stone Industry, Coal and Ore Mining, 2004, IranConMin2004—Market study: Tehran, Iran, 6th International Trade Fair for Machinery, Plant, Processes, Materials for Construction Industry, Building Materials and Natural Stone Industry, Coal and Ore Mining, 13 p.
- European Nickel plc, 2004, European Nickel starts feasibility study at Çaldag: London, United Kingdom, European Nickel plc press release, April 27, 2 p.
- Middle East Economic Digest, 2004a, Dubal move ahead with potline expansion: Middle East Economic Digest, v. 48, no. 22, May 28, p. 18.
- Middle East Economic Digest, 2004b, Group wins Al-Jalamid feasibility study: Middle East Economic Digest, v. 48, no. 1, January 2, p. 20.
- Union Capital Ltd., 2003, Update on Mehdiabad zinc project: Brisbane, Australia, Union Capital Ltd. press release, September 19, 1 p.
- U.S. Energy Information Administration, 2005a, Table 3.3—Petroleum imports from ...: Monthly Energy Review, February, p. 48-55.
- U.S. Energy Information Administration, 2005b, Table 9.2—F.O.B. costs of crude oil import from selected countries: Monthly Energy Review, February, p. 124.

## **Internet Reference Cited**

- Reuters, 2003 (September 15), Alcoa to acquire stake in Aluminium Bahrain smelter—Will provide long-term alumina supply, accessed September 15, 2003, at URL [http://biz.yahoo.com/rc/030915/minerals\\_alba\\_1.html](http://biz.yahoo.com/rc/030915/minerals_alba_1.html).

TABLE 1  
MIDDLE EAST: 2003 AREAL EXTENT AND ESTIMATED POPULATION

Country	Area (square kilometers)	Estimated population (millions)
Bahrain	665	0.7
Cyprus	9,250	0.8
Iran	1,648,000	66.4
Iraq	437,072	24.7
Israel	26,990	10.1
Jordan	92,300	5.3
Kuwait	17,820	2.4
Lebanon	10,400	4.5
Oman	212,460	2.6
Qatar	11,437	0.6
Saudi Arabia	1,960,582	22.5
Syria	185,180	17.4
Turkey	780,580	70.7
United Arab Emirates	82,880	4.0
Yemen	527,970	19.2
Total	6,003,586	251.8
United States	9,631,418	290.8
World	510,072,000,000	6,300.0

Source of area data: U.S. Central Intelligence Agency, World Factbook 2004.

Source of population data: World Bank Group, World Development Indicators Database, April 2005.

TABLE 2  
MIDDLE EAST: GROSS DOMESTIC PRODUCT IN 2003

Country	Estimated GDP (PPP) <sup>1, 2, 3</sup> (billions)	Estimated GDP (PPP) per capita <sup>1</sup>	Real GDP annual percentage change <sup>2</sup>
Bahrain	\$12.6	\$16,722	5.7
Cyprus	15	18,464	2.0
Iran	463	6,897	6.6
Iraq	38 <sup>4</sup>	1,500	-21.8 <sup>3</sup>
Israel	134	20,782	1.3
Jordan	23	4,108	3.2
Kuwait	35	13,747	10.1
Lebanon	20	5,480	3.0
Oman	36	15,431	1.4
Qatar	19	25,214	3.3
Saudi Arabia	271	11,849	7.2
Syria	63	3,585	2.6
Turkey	462	6,646	5.8
United Arab Emirates	82	20,216	7.0
Yemen	17	690	3.2
Total	1,689	6,708	2.7
United States	10,626	36,519	3.0
World	50,431	8,005	3.0

<sup>1</sup>Gross domestic product (GDP) based on purchasing power parity (PPP) valuation of country GDP.

<sup>2</sup>Source: International Monetary Fund, World Economic Outlook Database, September 2004.

<sup>3</sup>Table data compiled April 1, 2005; may be different than what is presented in individual country chapters.

<sup>4</sup>Source: U.S. Central Intelligence Agency, World Factbook 2004.

TABLE 3  
SELECTED MIDDLE EAST EXPLORATION ACTIVITY IN 2003

Country	Type <sup>1</sup>	Prospect	Commodity	Companies	Resource notes <sup>2</sup>	Exploration notes <sup>3</sup>
Turkey	F	Kazan	Soda ash	Riotur Madencilik A.Ş. (Rio Tinto plc)	607 million metric tons with an average grade of 31% trona	Previous extensive drill program

<sup>1</sup>F--Feasibility work ongoing/completed.

<sup>2</sup>Resources reported where available based on data from various public sources. Data were not verified by the U.S. Geological Survey.

<sup>3</sup>Extensive defined as greater than 10,000 meters of drilling.

TABLE 4  
MIDDLE EAST: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2003<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Country	Metals			Industrial minerals					Mineral fuels and related products	
	Aluminum, metal, primary	Chromite, mine output, gross weight	Steel, crude	Ammonia, N content	Cement, hydraulic	Gypsum	Phosphate rock, P <sub>2</sub> O <sub>5</sub> content	Potash, K <sub>2</sub> O equivalent	Petroleum	
									Crude, including condensate (thousand 42-gallon barrels)	Refinery products (thousand 42-gallon barrels)
Bahrain	532	--	--	312	70	--	--	--	13,700 <sup>e</sup>	92,400 <sup>e</sup>
Cyprus	--	--	--	--	1,637	300 <sup>e</sup>	--	--	--	6,916
Iran <sup>e</sup>	170	500	7,869 <sup>3</sup>	1,120	29,000	10,500	--	--	1,410,000	500,000
Iraq <sup>e</sup>	--	--	--	--	1,000	--	10	--	490,000	50,000
Israel <sup>e</sup>	--	--	150	--	5,150	140	1,020 <sup>3</sup>	1,960 <sup>3</sup>	22	84,867 <sup>3</sup>
Jordan	--	--	30 <sup>e</sup>	--	3,515	11 <sup>e</sup>	2,230	1,230	15	28,000 <sup>e</sup>
Kuwait <sup>e</sup>	--	--	--	444	1,600	--	--	--	817,000	285,000
Lebanon	--	--	--	--	2,900	2 <sup>e</sup>	--	--	--	--
Oman <sup>e</sup>	--	28	--	--	1,400	50	--	--	300,000	30,700 <sup>3</sup>
Qatar <sup>e</sup>	--	--	1,054 <sup>3</sup>	1,185 <sup>3</sup>	1,400	--	--	--	274,000	42,100
Saudi Arabia	--	--	3,944	1,743	23,000 <sup>e</sup>	450 <sup>e</sup>	--	--	3,583,000	607,000
Syria <sup>e</sup>	--	--	70	161 <sup>3</sup>	5,450	375	725 <sup>3</sup>	--	192,720 <sup>3</sup>	85,000
Turkey	63 <sup>e</sup>	282	17,644	289	35,077	197	--	--	17,000	171,900
United Arab Emirates <sup>e</sup>	560	10	50	421	6,600	100	--	--	920,000	131,000
Yemen <sup>e</sup>	--	--	--	--	1,541 <sup>3</sup>	42	--	--	157,000	34,900
Total	1,330	820	30,800	5,670	119,000	12,200	3,990	3,190	8,170,000	2,150,000
Share of world total	4.7%	5.3%	3.3%	5.2%	6.1%	11.1%	9.3%	11.3%	30.5%	8.1%
United States	2,700	--	93,700	8,770 <sup>4</sup>	94,300	16,700	10,600	1,100	2,070,000	6,380,000
World total	28,500	15,500	932,000	109,000	1,970,000	110,000	42,900	28,300	26,800,000	26,600,000

<sup>e</sup>Estimated; estimated data, U.S. data, and world totals are rounded to no more than three significant digits. -- Zero or zero percent.

<sup>1</sup>Totals may not add owing to independent rounding. Percentages are calculated on unrounded data. Table includes data available as of April 2005.

<sup>2</sup>In addition to the countries listed, Iran produced phosphate rock, but information is inadequate to estimate output.

<sup>3</sup>Reported figure.

<sup>4</sup>Synthetic anhydrous ammonia; excludes coke oven byproduct ammonia.

TABLE 5  
MIDDLE EAST: HISTORIC AND PROJECTED BAUXITE MINE PRODUCTION, 1990-2009

(Metric tons)

Country	1990	1995	2000	2003	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Iran	100,000 <sup>e</sup>	148,000	400,000 <sup>e</sup>	450,000 <sup>e</sup>	500,000	550,000	550,000
Turkey	773,000	232,278	458,537	364,306 <sup>r</sup>	300,000	300,000	300,000
Total	873,000	380,000	860,000	814,000 <sup>r, e</sup>	800,000 <sup>r</sup>	850,000	850,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised.



TABLE 6  
MIDDLE EAST: HISTORIC AND PROJECTED ALUMINUM PRODUCTION, 1990-2009<sup>1</sup>

(Metric tons)

Country	1990	1995	2000	2003 <sup>e</sup>	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Bahrain <sup>1</sup>	213,000	450,709	509,308	531,991 <sup>r</sup>	535,000 <sup>r</sup>	850,000	1,000,000
Iran	60,000	119,400	140,000 <sup>e</sup>	170,000 <sup>r, e</sup>	170,000 <sup>r</sup>	200,000 <sup>r</sup>	220,000
Turkey	61,000	61,514	61,000	63,000	75,000	110,000	110,000
United Arab Emirates	174,000	247,400	470,000	560,000 <sup>r, e</sup>	700,000 <sup>r, e</sup>	781,000	781,000
Total	508,000	879,000	1,180,000	1,320,000 <sup>r</sup>	1,460,000 <sup>r</sup>	1,940,000 <sup>r</sup>	2,110,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised.

<sup>1</sup>May include some secondary aluminum produced from used beverage cans.

TABLE 7  
MIDDLE EAST: HISTORIC AND PROJECTED COPPER MINE PRODUCTION, 1990-2009<sup>1</sup>

(Thousand metric tons, metal content of ore)

Country	1990	1995	2000	2003 <sup>e</sup>	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Cyprus	0	0	11	8	8	5 <sup>r</sup>	--
Iran	79	120 <sup>e</sup>	138 <sup>e</sup>	161 <sup>r</sup>	200	260	260
Oman	14	--	--	--	2	10	2
Saudi Arabia	1	1	1 <sup>e</sup>	1	1	--	1
Turkey	40	40	76	45 <sup>r</sup>	46 <sup>r</sup>	45 <sup>r</sup>	45
Total	134	161	226	215 <sup>r</sup>	257 <sup>r</sup>	320 <sup>r</sup>	308

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised.

-- Negligible or no production.

<sup>1</sup>Copper content of mined ore (gross weight).

TABLE 8  
MIDDLE EAST: HISTORIC AND PROJECTED REFINED COPPER METAL PRODUCTION, 1990-2009<sup>1</sup>

(Metric tons)

Country	1990	1995	2000	2003	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Cyprus <sup>2</sup>	--	--	5,197	2,552 <sup>r</sup>	2,000	1,000	--
Iran	47,800	90,400	132,000 <sup>e</sup>	134,632 <sup>r, 3</sup>	235,000 <sup>r</sup>	260,000 <sup>r</sup>	260,000
Oman	12,000	33,900	24,281	17,000 <sup>r</sup>	20,000 <sup>r</sup>	30,000	30,000
Turkey	84,200	100,300	64,100	45,000 <sup>r</sup>	50,000 <sup>r</sup>	80,000	50,000
Total	144,000	225,000	226,000	215,000 <sup>r</sup>	302,000	351,000	320,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

<sup>1</sup>May include secondary.

<sup>2</sup>Electrowon.

<sup>3</sup>Reported.

TABLE 9  
MIDDLE EAST: HISTORIC AND PROJECTED GOLD MINE PRODUCTION, 1990-2009

(Kilograms, metal content of ore)

Country	1990	1995	2000	2003 <sup>e</sup>	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Iran	500	630	765 <sup>e</sup>	500	600 <sup>r</sup>	900	900
Oman	54	591	551	4	--	--	--
Saudi Arabia	3,540	8,080	3,800 <sup>e</sup>	8,769 <sup>r, 1</sup>	7,000 <sup>r</sup>	9,000	9,000
Turkey	1,010	1,200	500 <sup>e</sup>	2,350 <sup>r, e</sup>	2,000	3,000	3,000
Total	5,100	10,500	5,620	11,600	9,600	12,900	12,900

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. -- Negligible or no production.

<sup>1</sup>Reported.

TABLE 10  
MIDDLE EAST: ESTIMATED HISTORIC AND PROJECTED IRON ORE MINE PRODUCTION, 1990-2009<sup>1</sup>

(Thousand metric tons, metal content of ore)

Country	Average grade	1990	1995	2000	2003	2005	2007	2009
Iran	49%	1,800	4,500	6,100	7,200 <sup>r</sup>	8,000 <sup>r</sup>	10,000 <sup>r</sup>	12,000
Turkey	53%	2,690 <sup>2</sup>	2,750	2,200	2,100 <sup>r</sup>	2,500	2,500	2,500
Total		4,490	7,250	8,300	9,300 <sup>r</sup>	10,500 <sup>r</sup>	12,500 <sup>r</sup>	14,500

<sup>r</sup>Revised.

<sup>1</sup>Estimated data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Reported.

TABLE 11  
MIDDLE EAST: HISTORIC AND PROJECTED IRON PRODUCTION, 1990-2009

(Metric tons)

Country	1990	1995	2000	2003	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Iran							
DRI <sup>1</sup>	264,000	3,301,000	4,740,000 <sup>e</sup>	5,620,000 <sup>r</sup>	5,650,000 <sup>r</sup>	5,700,000 <sup>r</sup>	5,700,000
Pig iron	1,270,000	1,532,000	2,200,000 <sup>e</sup>	2,300,000 <sup>r</sup>	2,500,000	2,500,000	2,500,000
Sub total	1,534,000	4,833,000	6,940,000	7,920,000 <sup>r</sup>	8,150,000 <sup>r</sup>	8,200,000 <sup>r</sup>	8,200,000
Iraq, DRI <sup>1</sup>	170,000	--	--	--	--	--	--
Qatar, DRI <sup>1</sup>	580,000	622,000	620,962	780,000 <sup>r</sup>	800,000 <sup>r</sup>	800,000 <sup>r</sup>	2,000,000
Saudi Arabia, DRI <sup>1</sup>	1,090,000	2,129,000	3,090,000	3,290,000 <sup>r</sup>	3,300,000	5,000,000	5,000,000
Turkey, pig iron	4,830,000	330,070	300,000 <sup>e</sup>	181,080 <sup>r</sup>	150,000	150,000	150,000
Total	8,200,000	7,910,000	11,000,000	12,200,000 <sup>r</sup>	12,400,000 <sup>r</sup>	14,200,000 <sup>r</sup>	15,400,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>Direct-reduced iron.

TABLE 12  
MIDDLE EAST: HISTORIC AND PROJECTED STEEL PRODUCTION, 1990-2009

(Thousand metric tons)

Country	1990	1995	2000	2003	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Iran	1,425	4,696	6,600 <sup>e</sup>	7,869 <sup>r</sup>	10,000	14,500	14,500
Iraq <sup>e</sup>	150	300	50	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	30
Israel <sup>e</sup>	144	200	270	150	150	150	150
Jordan <sup>e</sup>	179 <sup>1</sup>	30	30	30	30	30	30
Qatar	580	614 <sup>e</sup>	744	1,054 <sup>r</sup>	1,200 <sup>r</sup>	1,200 <sup>r</sup>	1,500
Saudi Arabia	1,833	2,451	2,973	3,944 <sup>r</sup>	4,000 <sup>r</sup>	5,200 <sup>r</sup>	5,200
Syria <sup>e</sup>	76 <sup>1</sup>	70	70	70	70	70	70
Turkey	9,322	12,744	14,325	17,644 <sup>r</sup>	17,700 <sup>r</sup>	17,700 <sup>r</sup>	18,000
United Arab Emirates <sup>e</sup>	--	--	70	50	70	70 <sup>r</sup>	70
Total	13,700	21,100	25,100	30,800 <sup>r</sup>	33,200 <sup>r</sup>	38,900 <sup>r</sup>	39,600

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. -- Negligible or no production.

<sup>1</sup>Reported.

TABLE 13  
MIDDLE EAST: HISTORIC AND PROJECTED LEAD MINE PRODUCTION, 1990-2009

(Metric tons, metal content of ore)

Country	1990	1995	2000	2003	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Iran	11,000	15,900	15,000 <sup>e</sup>	8,000 <sup>r, e</sup>	15,000	15,000	100,000
Saudi Arabia	250	50	50 <sup>e</sup>	60 <sup>e</sup>	10	50	50
Turkey	18,000	10,376	17,270	17,500 <sup>e</sup>	18,000	18,000	18,000
Yemen	--	--	--	--	--	2,000	8,000
Total	29,300	26,300	32,300	25,600 <sup>r, e</sup>	33,000	35,100	126,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. -- Negligible or no production.



TABLE 14  
MIDDLE EAST: HISTORIC AND PROJECTED PRIMARY REFINED LEAD PRODUCTION, 1990-2009

(Metric tons)

Country	1990	1995	2000	2003 <sup>c</sup>	2005 <sup>c</sup>	2007 <sup>c</sup>	2009 <sup>c</sup>
Iran <sup>c</sup>	--	4,000	15,000	12,000	12,000	12,000	12,000
Turkey <sup>c</sup>	5,400	2,000	--	--	--	--	--
Total	5,400	6,000	15,000	12,000	12,000	12,000	12,000

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 15  
MIDDLE EAST: HISTORIC AND PROJECTED SECONDARY REFINED LEAD PRODUCTION, 1990-2009

(Metric tons)

Country <sup>1</sup>	1990	1995	2000 <sup>c</sup>	2003 <sup>c</sup>	2005 <sup>c</sup>	2007 <sup>c</sup>	2009 <sup>c</sup>
Iran <sup>c</sup>	10,000	41,200	35,000 <sup>r</sup>	38,000	38,000	38,000	38,000
Israel	--	8,200	13,000 <sup>2</sup>	25,000	25,000	25,000	25,000
Turkey <sup>c</sup>	3,600	2,000	4,000	6,000 <sup>r</sup>	6,000 <sup>r</sup>	6,000 <sup>r</sup>	6,000
Total	13,600	51,400	53,000	69,000 <sup>r</sup>	69,000 <sup>r</sup>	69,000 <sup>r</sup>	69,000

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>1</sup>Revised. -- Negligible or no production.

<sup>1</sup>In addition to the countries listed, Saudi Arabia also produces secondary lead, but information is inadequate to estimate production.

<sup>2</sup>Reported.

TABLE 16  
MIDDLE EAST: HISTORIC AND PROJECTED NICKEL PRODUCTION, 1990-2009

(Metric tons, metal content of ore)

Country	1990	1995	2000	2003 <sup>e</sup>	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Turkey	--	--	--	640 <sup>r</sup>	3,000	15,000	15,000
Total	--	--	--	640 <sup>r</sup>	3,000	15,000	15,000

<sup>e</sup>Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised.

-- Negligible or no production.

TABLE 17  
MIDDLE EAST: HISTORIC AND PROJECTED SILVER MINE PRODUCTION, 1990-2009

(Kilograms, metal content of ore)

Country	1990	1995	2000	2003 <sup>e</sup>	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Iran <sup>e</sup>	38,000	60,000	22,000	23,000	23,000	25,000	150,000
Oman	3,000	100 <sup>e</sup>	4,894	--	--	--	--
Saudi Arabia	16,200	16,900 <sup>e</sup>	9,300 <sup>e</sup>	13,000	10,000	13,000	13,000
Turkey <sup>e</sup>	52,500	70,000	110,000	794,998 <sup>1</sup>	120,000	120,000	120,000
Yemen	--	--	--	--	--	5,000	25,000
Total	110,000	147,000	146,000	831,000	633,000	648,000	788,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

<sup>1</sup>Reported.

TABLE 18  
MIDDLE EAST: HISTORIC AND PROJECTED ZINC MINE PRODUCTION, 1990-2009

(Metric tons, metal content of ore)

Country	1990	1995	2000	2003 <sup>e</sup>	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Iran	29,000 <sup>e</sup>	145,100	90,000 <sup>e</sup>	120,000	125,000	125,000	300,000
Saudi Arabia	2,470	500 <sup>e</sup>	3,000 <sup>e</sup>	3,000	--	2,000	3,000
Turkey	39,000	9,118	39	34	50	60	60
Yemen	--	--	--	--	--	10,000 <sup>r</sup>	36,000
Total	70,500	155,000	93,000	123,000	125,000	137,100 <sup>r</sup>	339,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. -- Negligible or no production.

TABLE 19  
MIDDLE EAST: HISTORIC AND PROJECTED ZINC METAL PRODUCTION, 1990-2009

(Metric tons)

Country	1990	1995	2000	2003 <sup>e</sup>	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Iran	--	--	49,000	100,000	125,000	125,000	225,000
Saudi Arabia	--	--	--	--	--	-- <sup>r</sup>	--
Turkey	21,100	17,050	--	--	--	--	--
Total	21,100	17,100	49,000	100,000	125,000	125,000	225,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. -- Negligible or no production.

TABLE 20  
MIDDLE EAST: HISTORIC AND PROJECTED PHOSPHATE ROCK PRODUCTION, 1990-2009

(Thousand metric tons, P<sub>2</sub>O<sub>5</sub> content of ore)

Country	1990 <sup>e</sup>	1995	2000	2003 <sup>e</sup>	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Iraq <sup>e</sup>	270	300	200	10 <sup>r</sup>	100 <sup>r</sup>	200	300
Israel	1,104 <sup>1</sup>	1,264	1,305	1,020	1,020 <sup>r</sup>	1,020 <sup>r</sup>	1,020
Jordan	2,010	1,655	1,824	2,230 <sup>r</sup>	2,300	2,450	2,500
Saudi Arabia	--	--	--	--	--	--	1,400
Syria	511	477	646	725	870 <sup>r</sup>	850 <sup>r</sup>	850
Total	3,900	3,700	3,980	399	4,380 <sup>r</sup>	4,630	4,780

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. -- Negligible or no production.

<sup>1</sup>Reported.

TABLE 21  
MIDDLE EAST: HISTORIC AND PROJECTED SALABLE COAL PRODUCTION, 1990-2009<sup>1</sup>

(Thousand metric tons)

Country	1990	1995	2000	2003	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Iran	1,440	1,640	1,815	2,050 <sup>r, e</sup>	2,500	2,500	3,000
Turkey	52,530	59,408	64,645	46,839 <sup>r</sup>	45,000 <sup>r</sup>	45,000	40,000
Total	54,000	61,000	66,500	48,900	47,500	47,500	43,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised.

<sup>1</sup>Includes anthracite, bituminous, and lignite.



TABLE 22  
MIDDLE EAST: HISTORIC AND PROJECTED NATURAL GAS PRODUCTION, 1990-2009

(Million cubic meters, dry gas)

Country	1990	1995	2000	2003	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Bahrain	6,000	7,205	8,966	9,500	9,500	9,500	8,000
Iran	23,800	36,600	57,800	65,000 <sup>r, e</sup>	100,000	125,000	135,000
Iraq	4,200	3,000	3,000	1,500 <sup>r, e</sup>	3,000	3,000	3,000
Israel	40	21	10	8 <sup>r</sup>	720	720	700
Jordan	--	30	287	310 <sup>r</sup>	540	540	540
Kuwait	5,200	9,280	9,600	8,800 <sup>r, e</sup>	9,500	9,500	10,000
Oman	3,000	3,015	12,020	14,000 <sup>e</sup>	15,000	15,000	15,000
Qatar	6,090	13,600	26,141	30,000 <sup>e</sup>	35,000	60,000	80,000
Saudi Arabia	30,800	38,030	54,623	67,000 <sup>r, e</sup>	70,000	75,000	85,000
Syria	1,200	2,900	3,886	6,000 <sup>r</sup>	6,900	12,800	12,800
Turkey	212	182	612	276 <sup>r</sup>	400 <sup>r, e</sup>	500	500
United Arab Emirates	23,800	31,320	39,800	45,000 <sup>r</sup>	45,000 <sup>r</sup>	45,000 <sup>r</sup>	45,000
Yemen <sup>1</sup>	--	--	--	1 <sup>r</sup>	1 <sup>r</sup>	1 <sup>r</sup>	12,000
Total	104,000	145,000	217,000	247,000	296,000	357,000	408,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. -- Negligible or no production.

<sup>1</sup>Most produced natural gas in Yemen was stripped of liquids and reinjected.

TABLE 23

MIDDLE EAST: HISTORIC AND PROJECTED CRUDE PETROLEUM (INCLUDING CONDENSATE) PRODUCTION, 1990-2009

(Thousand 42-gallon barrels)

Country	1990	1995	2000	2003	2005 <sup>e</sup>	2007 <sup>e</sup>	2009 <sup>e</sup>
Bahrain	15,900	14,468	13,766	13,720 <sup>r</sup>	13,500	13,500	13,000
Iran	1,130,000	1,329,700	1,360,000 <sup>e</sup>	1,410,000 <sup>r, e</sup>	1,450,000 <sup>r</sup>	1,500,000 <sup>r</sup>	1,600,000
Iraq	745,000	205,000	937,000 <sup>e</sup>	490,000 <sup>r, e</sup>	600,000 <sup>r</sup>	800,000 <sup>r</sup>	900,000
Israel	94	36	31 <sup>r</sup>	22 <sup>r</sup>	25	25	20
Jordan	116	20	15	15	15	15	15
Kuwait	428,000	752,265	766,000	817,000 <sup>r</sup>	800,000	800,000 <sup>r</sup>	800,000
Oman	250,000	311,300	353,000	300,000 <sup>r, e</sup>	350,000	350,000	350,000
Qatar	148,044	142,300	231,000	274,000 <sup>r</sup>	270,000 <sup>r</sup>	270,000 <sup>r</sup>	270,000
Saudi Arabia	2,350,000	3,004,300	2,962,000	3,583,000 <sup>r</sup>	3,300,000 <sup>r</sup>	3,500,000 <sup>r</sup>	3,500,000
Syria	140,000	222,650	199,843	192,720 <sup>r</sup>	193,000	210,000	210,000
Turkey	26,600	24,124	19,783	17,000	15,000	15,000	15,000
United Arab Emirates	773,000	800,500	815,000	920,000 <sup>r</sup>	900,000 <sup>r</sup>	1,000,000 <sup>r</sup>	1,000,000
Yemen	73,000	125,925	167,000	157,000	170,000	170,000	170,000
Total	6,080,000	6,930,000	7,820,000	8,170,000 <sup>r</sup>	8,060,000 <sup>r</sup>	8,630,000 <sup>r</sup>	8,830,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised.